11-A

Notice of Allowability	Application No.	Applicant(s)	
	10/748,279	ASAKAWA, KAZUHIKO	
	Examiner	Art Unit	
	David Nhu	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *3/2/05*.

2. ☒ The allowed claim(s) is/are *1-19*.

3. ☒ The drawings filed on *31 December 2003* are accepted by the Examiner.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

REASONS FOR ALLOWANCE

1. Claims 1-19 are allowed.

2. The following is an examiner's statement of reasons for allowance: None of the references of record teaches or suggests as cited in claims 1, 6, 10, 14: forming, on a substrate on which a protection oxide film for protecting an active region and a nitride film to be used as an etching stopper are formed in this order, an insulation film for protecting the nitride film; performing a heat treatment to form a thermal oxidation film inside the trench; etching the nitride film using the insulation film with the widened aperture as a mask to move a step defined by the thermal oxidation film and the nitride film from an upper edge of the trench toward the inside of the active region; selectively etching the filling oxide film and the insulation film to expose the nitride film; etching the filling oxide film inside the trench so that a surface of the substrate is substantially level with a surface of the filling oxide film (as cited in claim 1); forming, on a substrate on which a protection oxide film for protecting an active region and a nitride film to be used as an etching stopper are formed in this order, a polysilicon film for protecting the nitride film; etching the polysilicon film, the nitride film, the protection oxide film, and the substrate on the semiconductor element separation region to form a trench; performing a heat treatment to form a thermal oxidation film inside the trench and to modify the polysilicon film into an oxide film; etching the nitride film using the oxide film as a mask and to move a step defined by the thermal oxidation film and the nitride film from an upper edge of the trench toward the inside of the active region; selectively etching the filling oxide film and the oxide film and the oxide film to expose the nitride film; etching the filling oxide film inside the trench so that a surface of the substrate is substantially level with a surface of the filling oxide film (as cited in claim 6);

forming, on a substrate on which a protection oxide film for protecting an active region and a nitride film to be used as an etching stopper are formed in this order, an insulation film for protecting the nitride film; etching the insulation film, the nitride film, the protection oxide film, and the substrate on the semiconductor element separation region to form a trench; performing a heat treatment to form a thermal oxidation film inside the trench; forming an oxide film to be used for forming spacers on a whole surface of the substrate and then forming oxide film sidewall spacers having a step below the substrate surface by etching back the oxide film; selectively etching the filling oxide film and the insulation film to expose the nitride film; etching the filling oxide film inside the trench and the oxide film sidewall spacers so that a surface of the substrate is substantially level with a surface of the filling oxide film (as cited in claim 10); forming, on a substrate on which a protection oxide film for protecting an active region and a nitride film to be used as an etching stopper are formed in this order, an insulation film for protecting the nitride film; etching the insulation film, the nitride film, the protection oxide film, and the substrate on the semiconductor element separation region to form a trench; performing a heat treatment to form a thermal oxidation film inside the trench; forming a polysilicon film on a whole surface of the substrate to form polysilicon film sidewall spacers on a sidewall of the trench by etching back the polysilicon film, the spacers having a step below the substrate surface; performing a heat treatment to modify the polysilicon film sidewall spacers into oxide film sidewall spacers; selectively etching the filling oxide film and the insulation film to expose the nitride film; etching the filling oxide film inside the trench and the oxide film sidewall spacers so that a surface of the substrate is substantially level with a surface of the filling oxide film (as cited in claim 14);

4. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

CONCLUSION

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Doong (6,740,592 B1): STI Scheme for Border less Contact Process.
Liu (6,197,659 B1): Divot Free STI Process.

6. Any inquiry concerning this communication on earlier communications from the examiner should be directed to David Nhu, (703) 306- 5796. The examiner can normally be reached on Monday-Friday from 7:30 AM to 5:00 PM.

The examiner's supervisor, David Nelms can be reached on (703) 308-4910.

The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

David Nhu

March 15, 2005

DAVID NHU
PRIMARY E